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Forage Utilization on Summer Cattle Ranges in Eastern Oregon

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INTRODUCTION

Summer ranges in the mountains of eastern Oregon do not provide enough forage for all the range livestock that can be maintained on the spring, fall, and winter ranges and on winter livestock feeds produced on the agricultural land. This shortage of summer forage is a limiting factor in the maintenance and growth of Oregon's range livestock industry. It is therefore highly important to make efficient use of these summer cattle ranges in order to assure sustained livestock production on a paying basis. A large part of the range is forested and is in public ownership. Values other than grazing are important, chiefly timber production, water yield, production of big game and fish, and recreation. Under efficient land management, all of these can be satisfactorily maintained.

Forests vary from dense to open-growing timber stands (fig. 1). Areas of untimbered-meadow and bunchgrass vegetation are usually scattered throughout the timbered range. In the mountains of eastern Oregon, untimbered range, be it subalpine grassland, wet mountain meadows, or dry meadow and bunchgrass types in the medium-altitude ponderosa pine[1] belt, is capable of producing far more forage per acre than the timbered range. In fact, subalpine grassland and wet mountain meadows in good condition[2] furnish 5 to 10 times more forage per acre than does range in the timber, and dry-meadow and bunchgrass types can produce at least 3 to 5 times more.

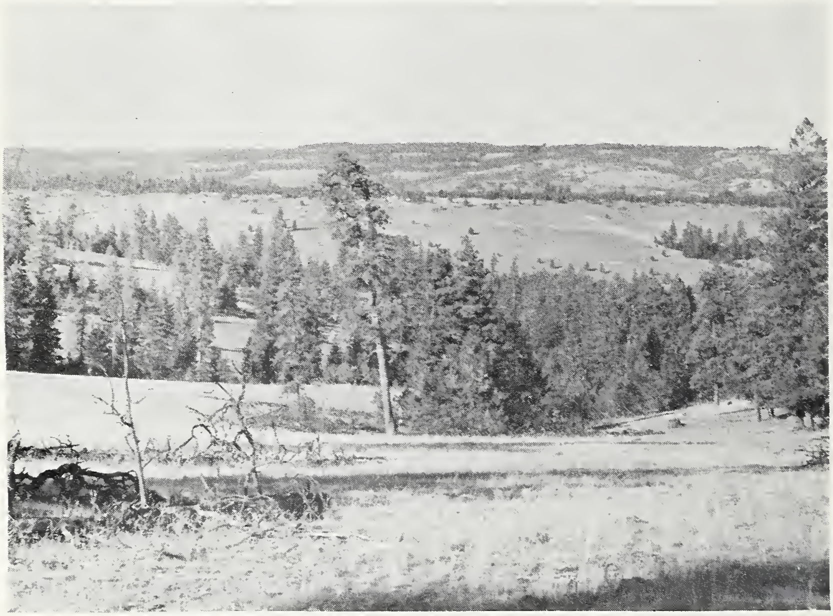
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FIGURE 1.—Valuable grassland scattered throughout dense to very open stands of timber is typical of summer cattle range in eastern Oregon.

There is far greater acreage of bunchgrass and dry-meadow than of wet-meadow or subalpine grassland. Subalpine grasslands are not grazed by cattle to the extent that they are by sheep because of the rugged topography and short grazing season at the high altitudes. Wet meadows are very important as cattle range, but they present distinct grazing problems which are discussed in another circular.[3]

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[1] Common and botanical names of the species mentioned are listed on p. 26.

[2] PICKFORD, G. D., and REID, E. H. BASIS FOR JUDGING SUBALPINE GRASSLAND RANGES OF OREGON AND WASHINGTON. U. S. Dept. Agr. Cir. 655, 38 pp., illus. 1942.

The bunchgrass type is ordinarily found on ridge tops, slopes, and other well-drained sites and the dry meadows in more moist places such as swales and depressions. However, in the Blue Mountains and on some other summer ranges in eastern and central Oregon where the topography is relatively gentle the two types frequently are intermingled. The bunchgrass grows on low mounds, a few square rods to several acres in extent, where the soil is loamy and friable. The dry-meadow type occurs in the low spots between the mounds on relatively moist and compact soil.

Two principal timbered range types—pine-bunchgrass and pinegrass-elk sedge—occur over extensive areas. The pine-bunchgrass type is characterized by a rather open, mature stand of ponderosa pine, with appreciable amounts of bunchgrasses and other forage species on the forest floor. In the southern half of eastern Oregon, sagebrush and antelope bitterbrush are important constituents of the type. Pinegrass-elk sedge range occurs under a denser, shadier forest of ponderosa pine, Douglas-fir, and western larch. Here, shade-loving grasses, grasslike plants, and weeds, such as pinegrass, elk sedge, and hawkweeds provide worthwhile forage. Some areas, however, are so densely forested that they have little if any value as cattle range.

The productive condition of ranges varies with the type and with past history of grazing use, and is determined by the kind, density, and vigor of the forage plants and degree of maintenance of soil fertility. A range in good or excellent condition is one which has a well-stabilized and productive soil and a practically full cover of vegetation, most of which is palatable to cattle. But long periods of overgrazing or other forms of poor land management, and the soil erosion which often follows, result in impaired range condition, lowered productivity, and undesirable changes in the vegetation and topsoil. Thus range in deteriorated condition—fair or poor—has a thinner stand of vegetation, the soil may be unstable, and the value of the forage is likely to be low.

In general, the untimbered summer ranges of eastern Oregon have been too heavily grazed in the past and are now in only fair or poor condition. The palatable and productive grasses have been largely replaced by inferior species. The scarcity of plant growth and quantities of small-sized rock on badly deteriorated dry meadows suggest that they are naturally unproductive. In fact, some are frequently called scabland. However, careful observation of the vegetation that reoccupies these areas when they are properly stocked and managed indicates that the so-called "scabs" can produce valuable range forage (fig. 2).

The pine-bunchgrass ranges have been less heavily used. Local overgrazing has resulted in some replacement of the palatable

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[3] REID, E. H., AND PICKFORD, G. D. JUDGING MOUNTAIN MEADOW RANGE CONDITION IN EASTERN OREGON AND EASTERN WASHINGTON. U. S. Dept. Agr. Cir. 748, 30 pp., illus. 1946.

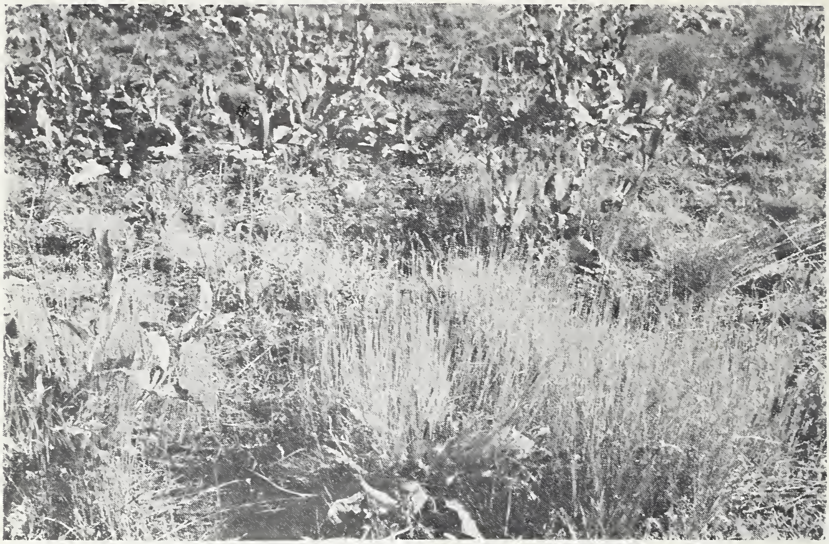

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FIGURE 2.—Thin bentgrass (foreground) reoccupying an area that formerly was "scab," in response to improved management. If the proper season and intensity of grazing is continued, this range will eventually be converted from a rocky, unproductive site covered with Sandberg bluegrass and weeds to a productive dry meadow thickly sodded with thin bentgrass.

grasses by inferior species, and logging operations have disturbed the ground cover and permitted annuals to become established on skid trails, but generally a considerable proportion of the productive forage plants has been retained.

The pinegrass-elk sedge type is usually in good condition. Since cattle prefer the more open areas, pinegrass-elk sedge ranges are seldom heavily grazed.

Grazing values of the different plants vary with such features as the composition of the vegetation in major types, abundance of the species in question, condition of the range, and many other comparable factors. The more productive, palatable plants are the ones which cattle prefer and it is vital to graze them in a manner to maintain them in good vigor. Thus the actual use of various plants is of considerable value as a key to management. Efficient use depends upon a knowledge of the relative values and the best time to graze the different forage plants and major range types in relation to the productive condition of the range.

This circular presents the results of a 2-year study of this problem on the Starkey Experimental Range, representative of many summer cattle ranges in eastern Oregon. The results apply specifically to mountainous cattle ranges in the ponderosa pine forest type of the Pacific Northwest, but many of the principles can be used in the management of mountainous range lands throughout the West.

THE STARKEY EXPERIMENTAL RANGE

The Starkey Experimental Range of 20,900 acres is located on the Whitman National Forest southeast of Pendleton, Oreg. Types commonly found on eastern Oregon summer ranges occur in mixture over the erperimental range. Approximately 3,500 acres are untimbered grassland, containing bunchgrass and dry-meadow types. About 13,200 acres of usable range occurs in the timber, part of which is in rather open mature ponderosa pine, and primarily supports bunchgrasses, while part is in a mixture of ponderosa pine, Douglas-fir, and western larch, which forms a denser, shadier forest and produces chiefly elk sedge and pinegrass forage. About 4,200 acres have a timber stand so dense as to discourage cattle grazing and so are regarded as waste for grazing use.

The Starkey range is moderately rolling, with few places where steepness of slope is an obstacle to efficient management. Water for cattle is adequate and rather well distributed.

The boundaries are fenced. Seven hundred and fifty cattle belonging to five national-forest grazing permittees, who form the Starkey Cattle Association, graze on the range from June 16 to October 15 each year. Such stocking represents conservative grazing use. In 1941, the cattle grazed seasonlong on the entire range, but a cross fence built in the spring of 1942 provided two grazing units. One was grazed from June 16 to July 31 and the other from August 1 to October 15. The length of these periods was fixed according to the estimated grazing capacity of each unit.

Cattle on the experimental range are handled in much the same manner as on many other summer ranges in eastern Oregon. The association employs a rider during the grazing season. His duties are to keep the cattle well distributed, to place salt at suitable locations and in sufficient quantities, and to repair fences and maintain water developments and other range improvements.

To study the herbage production and its utilization on the three major range types—untimbered, pine-bunchgrass, and pinegrass-elk sedge—three locations were selected at each of which these types are in close proximity. The amount of herbage produced and forage obtained by cattle during 1941 and 1942 were recorded periodically throughout the season at each location at points within the three types, but near enough to each other so that differences in utilization were due chiefly to the preferences of cattle and to inherent differences in the amount and character of the vegetation produced.

FORAGE AND UTILIZATION OF UNTIMBERED RANGE

Most of the cattle forage on untimbered ranges, except those in poor or very poor condition, is furnished by grasses (fig. 3). On the Starkey Experimental Range, where the untimbered bunchgrass and dry-meadow types were in only fair condition, an average of 1,362 pounds of herbage of all plants was produced per acre in 1941 and 1942 (table 1). Of this total, only 316 pounds had been eaten when the range was grazed as fully as it could be and yet maintain or increase the more important palatable plants. Two hundred and twenty-eight pounds, or 72 percent, of the forage came from grasses. Had this range been in good condition, with a better stand of grasses, it would have yielded proportionately more forage, and an even higher percent of the forage taken would have been furnished by grasses.

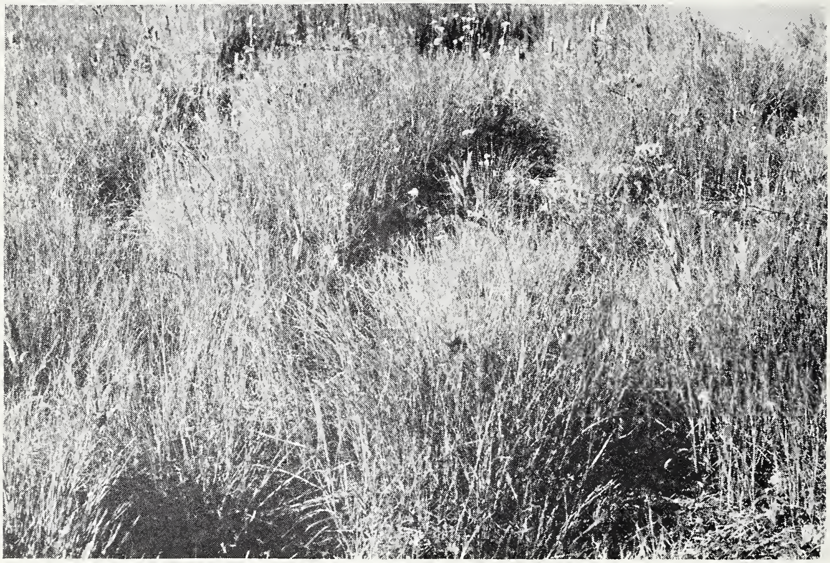
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FIGURE 3.—Untimbered bunchgrass ranges in good condition support a dense, thrifty cover of bearded bluebunch wheatgrass, smaller amounts of Idaho fescue, prairie junegrass, and Sandberg bluegrass, few weeds, and practically no shrubs. Such ranges furnish abundant cattle forage.

Although there are more than 25 grass species on the untimbered range, 5 that are heavy producers of palatable and nutritious forage on range in good condition are the most valuable. Bluebunch wheatgrass, prairie junegrass, and Idaho fescue are especially valuable on bunchgrass range, and red fescue and thin bentgrass on dry meadows. These 5 species produced less than half the grass herbage on the experimental plots within these types, yet nearly three-fourths of all the grass forage taken by the cattle was obtained from them.

Cattle ate 166 of the 349 pounds of herbage per acre that these grasses produced, and all but thin bentgrass had more than half their herbage grazed. Thin bentgrass could have been grazed more, and doubtless would have been, if an infestation of meadow mice had not cut down quantities of it at the ground line during 1941 and 1942. The stalks, clipped and cured like unraked hay, were not readily eaten by cattle.

TABLE 1.—*Average herbage production per acre, green weight, and utilization on untimbered dry-meadow and bunchgrass range in fair condition, 1941 and 1942*

Species	Herbage production	Forage obtained	Herbage utilization
Grasses and grasslike plants:	*Pounds*	*Pounds*	*Percent*
Bentgrass, thin	160.5	54.7	34
Bluegrass, Oregon	20.9	.7	3
Bluegrass, Sandberg	221.1	35.6	16
Brome, cheatgrass	7.0	(1)	(1)
Brome, mountain	3.6	1.6	44
Brome, soft	31.1	2.4	8
Danthonia, California	7.9	4.4	56
Danthonia, one-spike	7.9	4.3	54
Fescue, Idaho	2.8	1.5	54
Fescue, red	6.2	3.5	56
Hairgrass, annual	45.3	.3	1
Hairgrass, slender	.4	—	—
Junegrass, prairie	46.6	25.7	55
Rushes	104.0	12.4	12
Wheatgrass, bluebunch	133.2	80.1	60
Other grass and grasslike plants	2.2	.6	27
Total grass and grasslike plants	800.7	227.8	28
Weeds:			
Arnica	10.2	1.4	14
Aster, western	9.7	3.0	31
Checkermallow, Oregon	11.3	5.2	46
Clover, pussy	15.2	1.2	8
Eriogonum, Wyeth	133.2	2.8	2
Gumweed, low	24.4	5.0	20
Hawkweeds	4.8	2.2	46
Iris, Rocky Mountain	2.2	—	—
Lupines	3.8	.4	11
Pussytoes, rush	42.4	.8	2
Sieversia, prairiesmoke	14.7	2.4	16
Strawberries	2.4	—	—
Willowweed, autumn	39.6	7.0	18
Wyethia, mules-ears	47.2	41.2	87
Yarrow, western	135.9	8.8	6
Other weeds	62.3	4.6	7
Total weeds	559.3	86.0	15
Shrubs:			
Rose, peafruit	1.8	1.2	67
Snowberry, common	.6	.5	83
Total shrubs	2.4	1.7	71
All vegetation	1,362.4	315.5	23

[1] Less than 0.05 pound or 0.5 percent.

On this deteriorated range, bluebunch wheatgrass produced only 10 percent of the total vegetation, yet furnished more forage than any other plant—80 pounds per acre, or one-fourth of the entire forage grazed. Sixty percent of its herbage was grazed, all that it can withstand without losing productiveness. With the exception of thin bentgrass, all the other valuable plants were grazed as fully as possible from the standpoint of maintaining or increasing their abundance. Efficient management of eastern Oregon summer cattle ranges should strive to perpetuate and increase production of bluebunch wheatgrass and other palatable grasses.

Although over half the herbage produced by California and one-spike danthonia was grazed, these plants can hardly be classed as valuable on the untimbered types of eastern Oregon because they are seldom abundant enough on ranges in good or excellent condition to justify major consideration in grazing management plans.

Sandberg bluegrass and other less valuable grasses furnish proportionately little forage, even though they may be abundant and therefore produce considerable herbage. Thus, on the experimental range, Sandberg bluegrass produced considerably more herbage than any other plant, yet it supplied less than half as much forage as bluebunch wheatgrass and much less than thin bentgrass. With the stocking rate adjusted to proper use of the more valuable grasses, only 16 percent of the Sandberg bluegrass was taken. Cattle do not graze it readily except in spring and early summer before it dries.

If cattle are forced to graze Sandberg bluegrass and other inferior range grasses more heavily, the accompanying serious overuse of the better grasses will weaken or destroy them. Serious loss of forage production will eventually be the consequence. On the other hand, if efficient range management allows such valuable species as bluebunch wheatgrass to increase and replace inferior grasses, much greater grazing values will be built up.

Weeds, principally Wyeth eriogonum, western yarrow, rush pussytoes, autumn willowweed, and low gumweed, produced 559 pounds of herbage per acre, 41 percent of the total vegetation on the untimbered range. The abundance of these weeds which are not conspicuous on grasslands in good condition indicates the lowered condition on bunchgrass and dry-meadow types on the experimental area. However, only 86 pounds of weeds per acre were grazed, and only one species, mules-ears wyethia, is sufficiently important as forage to be mentioned.[4] This plant, sometimes called sunflower or yellowdock, is abundant on range in fair condition. Other weeds, such as western yarrow and Wyeth eriogonum, produced considerable herbage, but are low in palatability for cattle and were grazed very lightly.

Shrubs generally are not very abundant on bunchgrass and dry-meadow range in eastern Oregon. They made up less than 1 percent of the total forage on the experimental area. Shrubs, however, add desired variety to the cattle diet and because of their scarcity are rather heavily utilized by game and livestock. More shrubs would probably be present if the range were in good condition, but it is doubtful if they are ever much of a factor in efficient management of the untimbered types.

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[4] A large proportion of the grazing on mules-ears wyethia occurred each year prior to the time cattle entered the experimental area. Observations made subsequently have shown that mules-ears wyethia is grazed by big game animals in the early spring and the early grazing obtained in the study was undoubtedly game use.

Signs of Proper Utilization

It will be clearly evident from these records of actual grazing that proper utilization of the untimbered range does not mean that all its vegetation is grazed uniformly close. Cattle are naturally attracted to the more palatable grasses. Consequently, when the range is in poor or fair condition, so much unpalatable plant growth may be left ungrazed that casual observation would indicate extremely light use.

Closer inspection, however, often reveals that the important forage species, which should be maintained and increased, are grazed as much as they can safely withstand. For example, only 23 percent of the total herbage on the untimbered types of the Starkey range was grazed by the close of the grazing season. Yet such grasses as bluebunch wheatgrass and prairie junegrass that must be maintained if the range is to hold or increase its productiveness were utilized 60 and 55 percent, respectively—as fully as is considered safe. Efficient utilization, therefore, is judged not by the consumption of the vegetation as a whole but by the degree to which the better grasses are grazed. Ranges in good condition, which support more of the better forage grasses and relatively little Sandberg bluegrass or other low-value plants, can be grazed so that a larger proportion of the total herbage production is utilized.

Nutritive-Plant Values

Properly grazed untimbered range in good or excellent condition will produce better weight gains in cattle than ranges in poor or fair condition, not only because of the increased forage supply but also because the herbage has greater nutritive value. Tests[5] of herbage collected at 2-week intervals during the 1941 grazing season revealed that the average protein content of oven-dried bluebunch wheatgrass and thin bentgrass was 6.93 percent and 5.60 percent, respectively, while Sandberg bluegrass averaged only 4.41 percent. The percentage of crude protein needed to maintain cattle weights on eastern Oregon summer ranges has never been determined. A summary of available information indicates that the minimum requirement varies from 4.3 to 9.2 percent, depending upon the class and age of cattle.[6] The recommended minimum protein allowance for cows nursing calves, the kind of cattle most commonly grazed on eastern Oregon summer ranges, is 5 percent; and forage with less than this amount may be considered inadequate. Bluebunch wheatgrass provided more than the 5-percent minimum protein content throughout the grazing season and thin bentgrass until late September (fig. 4). The protein content of Sandberg bluegrass was adequate for only about 2 weeks of the grazing period in early summer and again in the fall when regrowth occurred. Furthermore, tests showed that bluebunch wheatgrass also had a higher phosphorus content than did Sandberg bluegrass.

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[5] The writers are indebted to Dr. J. R. Haag of the Oregon Agricultural Experiment Station, Corvallis, Oreg., for making the chemical analysis of the forage plants reported in this circular.

[6] Gilbert, H. R., Gerlaugh, Paul, and Madsen, L. L. RECOMMENDED NUTRIENT ALLOWANCES FOR BEEF CATTLE. (Recommended Nutrient Allowances for Domestic Animals, No. IV.) Natl. Res. Council, Washington, D. C. 31 pp., illus. 1945.

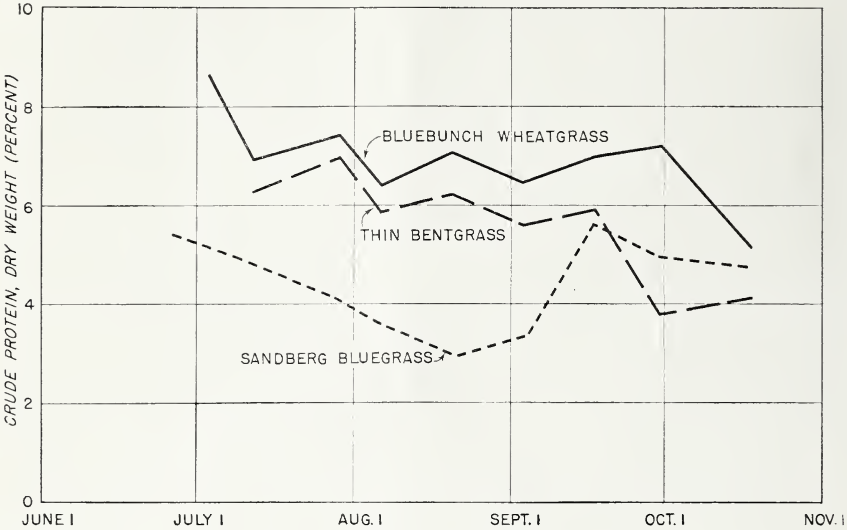

FIGURE 4.—Crude-protein content of important grasses of the untimbered-range type, 1941.

These tests clearly indicate that deteriorated untimbered grassland on which Sandberg bluegrass is the chief species is less capable of producing rapid gains in cattle during the summer grazing period than ranges in good condition which furnish principally bluebunch wheatgrass, thin bentgrass, and other more nutritious forage.

FORAGE AND UTILIZATION OF PINE-BUNCHGRASS RANGE

Most of the important forage plants on the untimbered types occur also in the pine-bunchgrass range, especially on the less heavily timbered portions, where the trees may be so scattered that growing conditions resemble those of the untimbered areas (fig. 5). However, the presence of trees favors the more shade-tolerant plants in the understory, and these assume greater importance as forage.

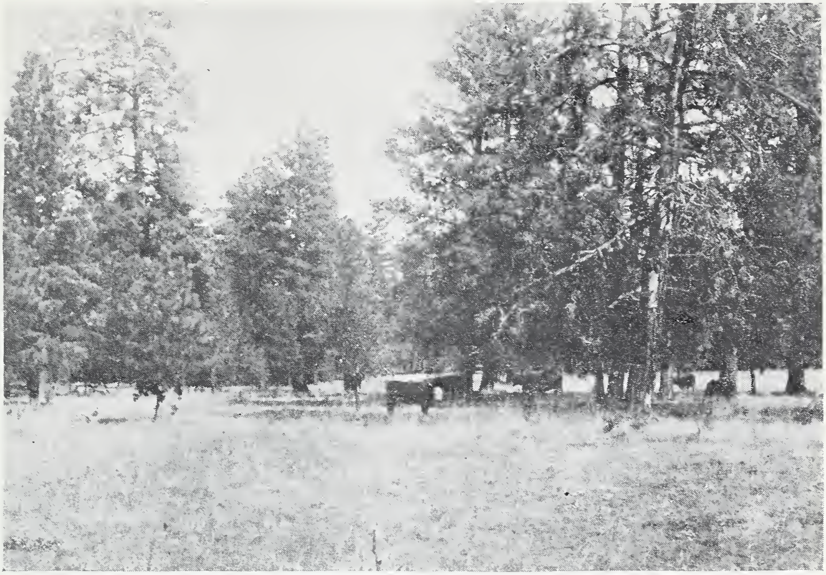
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FIGURE 5.—Pine-bunchgrass range found in open-grown ponderosa pine stands in eastern Oregon is essentially grassland, even though weeds and shrubs are present and may be more conspicuous than on untimbered ranges.

On pine-bunchgrass range of the Starkey Experimental Range 1,087 pounds of green herbage was produced per acre (table 2). Only 217 pounds or 20 percent was taken when the range was grazed to the correct degree. Fifty-eight percent of the forage eaten consisted of grasses, which thus comprised the most important group of forage plants.

Of the grasses and grasslike plants, elk sedge, Idaho fescue, prairie junegrass, and bluebunch wheatgrass are the most valuable. Elk sedge ranks high both in palatability and abundance. It furnished 28.8 pounds of forage per acre, nearly one-fourth of all the grass and grasslike forage eaten, and 45 percent of its herbage was grazed. Idaho fescue and prairie junegrass were less readily grazed, 22 and 30 percent respectively, but are important forage grasses because of their heavy herbage production. As in the untimbered grassland, bluebunch wheatgrass was the most palatable grass, but it was much less abundant, and produced only about 14 pounds of forage per acre.

Pinegrass is quite readily eaten by cattle—26 percent of its herbage was grazed—but it is a shade-loving species and not a heavy forage producer on pine-bunchgrass ranges generally.

Forty-seven percent of the soft brome herbage was grazed, but this grass dries early in the summer and becomes unpalatable. Furthermore, it is abundant only on pine-bunchgrass ranges whose condition has been greatly lowered or the soil disturbed by logging, and so is not considered an important forage plant.

TABLE 2.—*Average herbage production per acre, green weight, and utilization on pine-bunchgrass range, 1941 and 1942*

Species	Herbage production	Forage obtained	Herbage utilization
Grasses and grasslike plants:	*Pounds*	*Pounds*	*Percent*
Bentgrass, thin	9.8	1.6	16
Bluegrass, Kentucky	8.5	1.8	21
Bluegrass, Sandberg	93.7	5.8	6
Bluegrass, Wheeler	7.2	.9	12
Brome, cheatgrass	32.8	.2	1
Brome, mountain	19.2	3.1	16
Brome, soft	19.0	8.9	47
Fescue, Idaho	113.8	25.0	22
Junegrass, prairie	73.0	22.2	30
Pinegrass	30.6	7.9	26
Rushes	4.7	1.0	21
Sedge, elk	64.2	28.8	45
Wheatgrass, bluebunch	23.6	13.9	59
Other grass and grasslike plants	18.7	5.2	28
Total grass and grasslike plants	518.8	126.3	24
Weeds:			
Arnica	23.8	1.8	8
Arnica, heartleaf	12.0	(1)	(1)
Clover, pussy	8.1	.3	4
Hawkweeds	65.2	40.4	62
Iris, Rocky Mountain	15.0	(1)	(1)
Lupines	88.7	4.0	5
Pearleverlasting, common	10.4	.5	5
Penstemon, yellow	4.8	1.0	21
Pussytoes, rush	27.2	.9	3
Sieversia, prairiesmoke	40.0	5.4	14
Stonecrops	28.0	(1)	(1)
Strawberries	30.4	1.4	5
Wyethia, mules-ears	6.6	5.4	82
Yarrow, western	88.0	8.9	10
Other weeds	44.2	3.1	7
Total weeds	492.4	73.1	15
Shrubs:			
Rose, peafruit	6.2	1.0	16
Snowberry, common	47.0	13.8	29
Spirea, shinyleaf	15.4	2.9	19
Other shrubs	7.6	.2	3
Total shrubs	76.2	17.9	23
All vegetation	1,087.4	217.3	20

[1] Less than 0.05 pound or 0.5 percent.

Sandberg bluegrass, though common on the pine-bunchgrass range, is not abundant if the type is in good condition and is practically ungrazed by cattle on properly used timbered range. It is even less valuable here than on the untimbered grassland.

A variety of weeds make up nearly half the total herbage and and about one-third the forage in the pine-bunchgrass type. With the exception of hawkweeds, however, no one weed combines high palatability with sufficient abundance to assume importance as forage. Hawkweeds of several species are very abundant and highly palatable and produced 40 pounds of forage per acre, more than any other plant.

Shrubs are much more plentiful than in the untimbered types, but even so comprise less than one-tenth of the total vegetation. Only one species, common snowberry, which produced 13.8 pounds of forage per acre, is sufficiently abundant and palatable to be classed as important.

The effect of a timber overstory on palatability of the forage species becomes evident when the intensity of use is compared on timbered and untimbered types (tables 1 and 2). Idaho fescue and prairie junegrass are choice plants on the open grassland, but are grazed much more lightly on the pine-bunchgrass type. Sandberg bluegrass was poor forage on either type but cattle had grazed about 16 percent of its herbage at the time they had made proper use of the more valuable plants of the untimbered bunchgrass range, whereas it was scarcely eaten on properly grazed timbered range. The reason for the lowered palatability of certain forage plants when found in the timber is not known. An increase in numbers of cattle grazed in order to utilize up to 50 percent of the herbage of such grasses as Idaho fescue and prairie junegrass would undoubtedly result in serious overuse of the valuable elk sedge and hawkweeds on the pine-bunchgrass type and cause severe overgrazing of the good forage plants on the untimbered ranges.

FORAGE AND UTILIZATION OF PINEGRASS-ELK SEDGE RANGE

The pinegrass-elk sedge range on the Starkey Experimental Range (fig. 6), which represents good conditions for the type, produced only 765 pounds of range vegetation per acre, of which 132 pounds, or 17 percent, was grazed (table 3). This was less than half the forage furnished by the untimbered range.

As in the other types, grasses and grasslike plants produced most of the forage and were the most palatable. They furnished 73 percent of the total forage. Of these, elk sedge and pinegrass, which together make up about 30 percent of the total vegetation and 57 percent of the total forage, are the major plants. Thin bentgrass, more palatable here than in the other range types, is the most palatable of all species occurring in the type, but is only moderately abundant and produced only 10 percent of the total forage.

More than half the vegetation consisted of weeds and shrubs, but these provided less than 27 percent of the forage. Hawkweeds,

TABLE 3.—*Average herbage production per acre, green weight, and utilization on pinegrass-elk sedge range, 1941 and 1942*

Species	Herbage production	Forage obtained	Herbage utilization
Grasses and grasslike plants:	*Pounds*	*Pounds*	*Percent*
Bentgrass, thin	28.7	13.2	46
Fescue, Idaho	2.4	.5	21
Fescue, western	17.1	.4	2
Hairgrass, slender	18.2	.6	3
Junegrass, prairie	12.8	3.2	25
Pinegrass	119.1	37.2	31
Sedge, elk	107.4	38.0	35
Sedge, northwestern	8.2	1.2	15
Trisetum, tall	8.4	.7	8
Other grass and grasslike plants	13.2	1.8	14
Total grass and grasslike plants	335.5	96.8	29
Weeds:			
Arnica, heartleaf	79.6	8.8	11
Frasera, showy	12.0	.2	2
Hawkweeds	20.8	7.7	37
Lupines	47.2	.2	([1])
Pearleverlasting, common	27.9	1.7	6
Penstemon, yellow	10.8	1.6	15
Sieversia, prairiesmoke	3.2	.3	9
Stonecrop	3.5	—	—
Strawberries	37.7	.6	2
Yarrow, western	20.0	1.2	6
Other weeds	32.9	3.6	11
Total weeds	295.6	25.9	9
Shrubs:			
Manzanita, pinemat	75.5	—	—
Rose, peafruit	4.4	.6	14
Snowberry, common	18.4	3.8	21
Spirea, shinyleaf	32.8	4.9	15
Other shrubs	3.2	.4	12
Total shrubs	134.3	9.7	7
All vegetation	765.4	132.4	17

[1] Less than 0.5 percent.

moderately abundant and highly palatable, and heartleaf arnica, very abundant and rather palatable, are the leading forage producers. But none of the shrubs combines sufficient abundance and palatability to be important as forage.

Except for pinegrass, thin bentgrass, and heartleaf arnica, most plants that grow in abundance on this type are less palatable to cattle than when they occur in more open areas. Thin bentgrass, not truly a timbered-range plant, is found in small, meadowlike openings. Pinegrass and heartleaf arnica are better forage plants in the denser timber perhaps because they retain moisture longer and do not toughen as quickly as in the less wooded pine-bunchgrass areas.

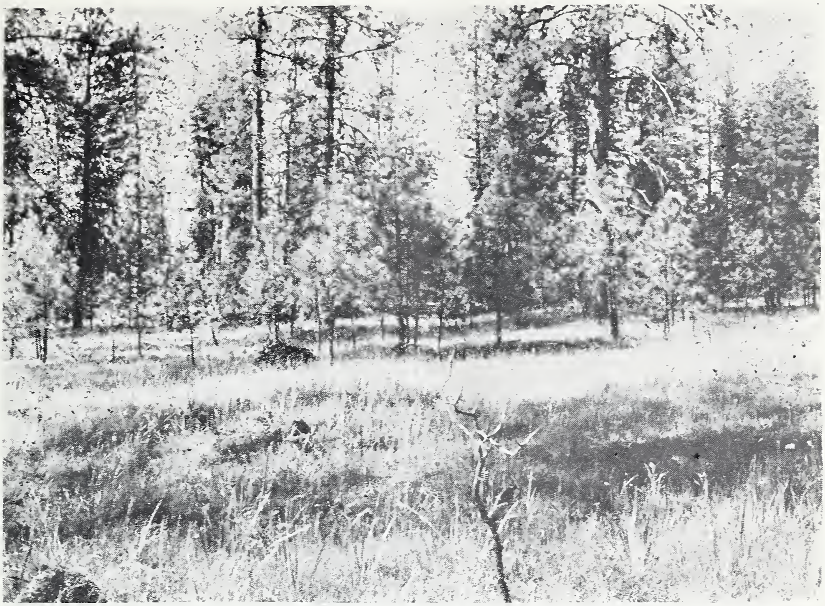

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FIGURE 6.—The pinegrass-elk sedge type produces a herbage cover in which weeds and shrubs are abundant. As its name implies, most of the cattle forage is obtained from pinegrass and elk sedge.

SEASONAL VALUES OF MAJOR RANGE TYPES

Each of the summer range types must be used as fully as possible if maximum production and efficient livestock operation is to be realized. Although the untimbered range types are most productive and generally receive the heaviest use, the cattle's preference varies with the season, and this provides one means of obtaining more uniform and efficient utilization of the range as a whole. Knowledge of the seasonal values of range types can be used to determine the best salting, riding, and fencing practices that will promote the most efficient use of the ranges.

Untimbered-Range Types Are Grazed Consistently Seasonlong

Cattle graze the untimbered grassland without noticeable let-up during the summer grazing season, resulting in a rather steady increase in the amount of the vegetation consumed on these types throughout the summer (table 4). During 1941, for example, the proportion of vegetation grazed increased from 2 to 5 percent every two weeks until July 24 when 11.1 percent of the range herbage was utilized, and from 1 to 3 percent each 2-week period thereafter until a total of 21.3 percent utilization of herbage was reached at the end of the grazing season in October. Forage use,

TABLE 4.—*Utilization of herbage of important range plant species on summer cattle range grazed seasonlong, 1941*

Range type and plant species	Utilization at various dates								
	June 27	July 11	July 24	Aug. 7	Aug. 20	Sept. 4	Sept. 16	Sept. 30	Oct. 15
Untimbered:	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Grasses and grasslike plants:									
Bentgrass, thin	2.7	6.4	17.1	17.7	19.5	20.4	21.3	24.1	24.6
Bluegrass, Sandberg	.3	3.3	7.9	10.0	10.7	10.9	14.2	16.0	18.4
Junegrass, prairie	3.0	11.0	23.5	26.2	32.2	40.1	47.3	56.9	58.7
Wheatgrass, bluebunch	2.9	8.8	14.5	17.7	22.3	32.3	49.7	56.1	57.8
Total grass and grasslike plants	1.4	4.8	10.3	12.2	14.3	17.4	22.2	25.8	27.2
Weeds:									
Aster, western	1.6	1.6	8.8	12.8	12.8	12.8	12.8	12.8	12.8
Willowweed, autumn	1.2	5.1	7.3	7.4	8.2	8.2	8.2	8.2	8.2
Wyethia, mules-ears	26.2	76.7	80.8	80.8	80.8	80.8	80.8	80.8	80.8
Yarrow, western	1.4	3.6	6.1	6.2	6.3	6.3	6.3	6.3	6.3
Total weeds	3.5	10.1	12.0	12.2	12.5	12.7	13.1	13.3	13.6
All vegetation	2.3	7.1	11.1	12.2	13.5	15.4	18.3	20.4	21.3
Pine-bunchgrass:									
Grasses and grasslike plants:									
Bluegrass, Sandberg	—	.5	2.7	4.1	5.0	5.6	6.1	6.4	6.4
Fescue, Idaho	.3	2.2	7.1	11.0	17.9	21.3	22.2	23.2	23.6
Junegrass, prairie	.5	1.8	8.6	15.5	29.0	32.9	33.7	34.6	35.8
Sedge, elk	5.9	13.9	22.1	32.4	40.8	44.1	46.7	48.4	48.8
Total grass and grasslike plants	.9	3.8	8.6	13.1	19.3	21.8	22.9	24.0	24.3
Weeds:									
Hawkweeds	16.0	47.4	52.5	57.9	57.9	57.9	57.9	57.9	57.9
Yarrow, western	.3	3.2	5.5	7.1	7.6	7.6	7.6	7.6	7.6
Total weeds	2.4	7.1	8.8	11.2	11.7	12.0	12.0	12.3	12.8
Shrubs:									
Snowberry, common	.3	6.8	12.6	15.0	15.4	16.7	18.2	20.2	21.0
Spirea, shinyleaf	.8	1.9	6.9	9.1	9.6	9.6	10.4	11.2	12.8
Total shrubs	.3	4.4	8.7	10.8	11.3	12.1	13.1	14.4	15.2
All vegetation	1.5	5.3	8.7	12.1	15.5	16.8	17.5	18.2	18.6
Pinegrass-elk sedge:									
Grasses and grasslike plants:									
Pinegrass	1.1	4.8	9.7	12.7	23.2	25.8	25.8	25.8	25.8
Sedge, elk	3.5	9.5	12.6	18.3	26.0	29.0	31.4	32.7	32.7
Total grass and grasslike plants	1.8	5.7	10.6	14.0	22.2	24.8	26.0	26.5	26.5
Weeds:									
Arnica, heartleaf	—	3.1	3.7	3.7	3.7	3.9	3.9	3.9	3.9
Hawkweeds	8.2	19.9	22.8	31.2	35.8	37.4	37.4	37.4	37.4
Total weeds	.5	3.0	4.1	5.0	5.9	6.2	6.2	6.3	6.3
Shrubs:									
Snowberry, common	—	3.9	7.6	7.6	8.1	9.2	10.7	11.3	12.8
Spirea, shinyleaf	.5	3.6	5.2	5.5	7.1	9.0	10.0	11.5	12.1
Total shrubs	.1	1.1	1.9	2.0	2.5	3.0	3.4	3.7	3.9
All vegetation	.9	3.7	6.0	7.7	11.2	12.4	13.0	13.2	13.3

taking into account 46 pounds per acre obtained from regrowth after September 1, was slightly more than half completed by August 20, approximately the middle of the grazing season.

Good forage species, such as bluebunch wheatgrass, prairie junegrass, and thin bentgrass are chiefly responsible for this steady grazing. For example, the utilization of bluebunch wheatgrass increased considerably in each 2-week period except the last. This species as well as prairie junegrass was grazed intensely from late August until the end of September. Thin bentgrass was utilized most intensively from the middle of June to late July. After July its use was steady but light, partly because meadow mice did extensive damage by clipping stems.

It is natural in midsummer for cattle to prefer the more tender, green blades of bluebunch wheatgrass, prairie junegrass, and thin bentgrass to the dried herbage of Sandberg bluegrass. In 1941 Sandberg bluegrass was used lightly but steadily until early August, was almost totally ignored by cattle for a month, and then grazed lightly until the end of the season. The interrupted grazing was partly due to its habit of drying up earlier than the better range grasses. For example, in 1941 Sandberg bluegrass began to turn brown by July 14 and was totally cured by August 18, despite very favorable growing conditions, with more than 15 inches of rainfall from June 1 to October 31. About 3½ inches of rain fell during the period when the grass was curing. In contrast, bluebunch wheatgrass and thin bentgrass did not become noticeably dry until after September 1, and were partly green at the close of the grazing season.

Grazing of Sandberg bluegrass was resumed because of fall regrowth, amounting to 66.8 pounds green weight per acre, resulting from summer and fall rains. Regrowth, however, is an undependable source of forage and should not be counted on in determining the grazing capacity of eastern Oregon summer ranges. During dry summers and autumns, for example, Sandberg bluegrass produces no regrowth whatsoever. When regrowth occurs, therefore, it should be regarded as extra forage which helps to maintain the good condition or induce faster recovery of the range.

Another reason for the cessation of grazing of Sandberg bluegrass in midsummer may be the steady reduction in protein content of this grass, from 5.41 percent on June 25 to 2.96 percent on August 20 (fig. 4). With the start of regrowth on September 3, protein content rose sharply, reaching a peak of 5.64 percent on September 16 and then gradually declining until the end of the grazing season. In contrast, bluebunch wheatgrass and thin bentgrass were well above the minimum protein level when Sandberg bluegrass was deficient. The period from about July 6 to September 13, when Sandberg bluegrass was deficient in protein, coincided approximately with the period when the species was not grazed. During this period bluebunch wheatgrass, which more adequately met the protein needs of the cattle, was grazed most intensively.

In a dry summer and fall the nutritive value of Sandberg bluegrass would probably not increase since no regrowth would occur. In that event, the grass would be low in protein throughout all but the very early part of the grazing season.

Weeds on untimbered range are grazed chiefly during June and July and but little thereafter (table 4). The early and abrupt cessation of grazing of weeds is due chiefly to the fact that their herbage dries and becomes unpalatable or unavailable. This usually occurs by mid-July.

Untimbered areas are evidently favored by cattle throughout the summer largely because of the sustained palatability of such grasses as bluebunch wheatgrass, prairie junegrass, and thin bentgrass, characteristic of good range condition. If the vegetation consists mainly of these, good forage will be produced in greater amounts and will be grazed readily throughout the summer. On the other hand, if the untimbered range reverts to species such as Sandberg bluegrass and weeds, little forage of value is available after July.

MOST USE OF TIMBERED RANGE IS OBTAINED BEFORE MIDSUMMER

On timbered summer range the heaviest cattle grazing takes place during the first half of the season. More than four-fifths of the use made of the pine-bunchgrass and pinegrass-elk sedge areas in 1941 had occurred by August 20 (table 4). By then the season's utilization of all important grasses and grasslike species was more than three-fourths completed. Grazing of weeds was practically over and more than half of the total use of shrubs made by August 7.

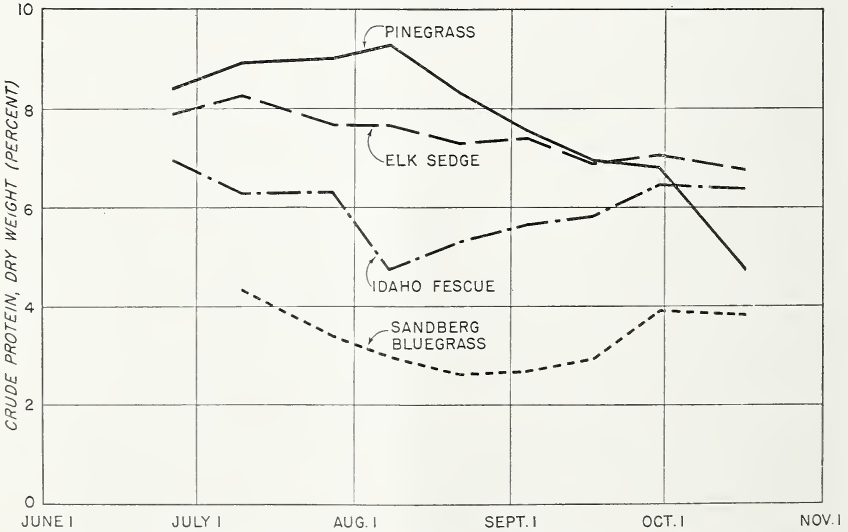

FIGURE 7.—Crude-protein content of important grass and grasslike species of the timbered range types—1941.

For the first half of the summer season the timbered types are good cattle range. The total vegetation of the pine-bunchgrass type was grazed about as intensively as on the untimbered range until the middle of September, while intensity of grazing on pinegrass-elk sedge range nearly equaled that on the untimbered grasslands by August 20.

The forage in the timbered areas appears to be as nutritious as that in the openings. Protein contents of elk sedge and pinegrass were well above the minimum 5 percent level during the summer of 1941 on the Starkey Experimental Range; that of Idaho fescue dropped slightly below 5 percent during a dry spell in early August but was otherwise higher throughout the season (fig. 7). Only Sandberg bluegrass was consistently low in protein, and it is noteworthy that on timbered range, cattle grazed this species very lightly.

RELATIVE VALUES OF MAJOR RANGE TYPES ARE GUIDES TO EFFICIENT USE

There are great differences in the grazing values of the three major summer-range types in eastern Oregon and in the use cattle make of them. These differences relate to the normal grazing habits of cattle and the variations in the forage values of the plants included in the three types. Knowledge of such factors makes it possible to manage grazing on summer ranges in such a manner as to obtain reasonable use of the whole without damage to any part.

For example, knowledge of the relative forage production and normal use by cattle of the three major types will enable one to select the most valuable type, and the most significant plant species within it, as guideposts for determining the efficiency of management. Satisfactory maintenance and use of the important species on the most productive type is a good indication of efficient management. On the other hand, if a type that should be very productive consistently furnishes little forage, better management is needed to increase its production.

Untimbered Ranges Are Most Valuable

During the summer grazing season, cattle having free choice obtained much more forage per acre from the untimbered range than from the two other major types—316 pounds compared with 217 pounds for pine-bunchgrass and only 132 pounds for timbered pinegrass-elk sedge range. In other words, the same area of the untimbered grassland furnished 46 percent more forage than the pine-bunchgrass and 139 percent more than the pinegrass-elk sedge. Had the untimbered range been in good rather than fair condition, its value would have been proportionately greater.

The nature of cattle grazing on the major types thus emphasizes the need for paying close attention to the utilization and general condition of good forage grasses on the untimbered range. This is particularly true if the bunchgrass and dry-meadow areas constitute as much as 10 percent of the total range. More than half the forage obtained from the untimbered range on the Starkey Experimental Range comes from plants, largely grasses, whose average utilization of herbage is 50 percent or more (fig. 8). This degree of use is considered to be as high as most species can withstand safely. Only about 27 percent of the forage in the pine-bunchgrass type and none in the pinegrass-elk sedge is furnished by plant species whose average utilization exceeds 50 percent. The vegetation of untimbered bunchgrass and dry-meadow areas is most vulnerable to damage from cattle grazing because this vegatation consists of species more palatable on the average than those on the timbered range.

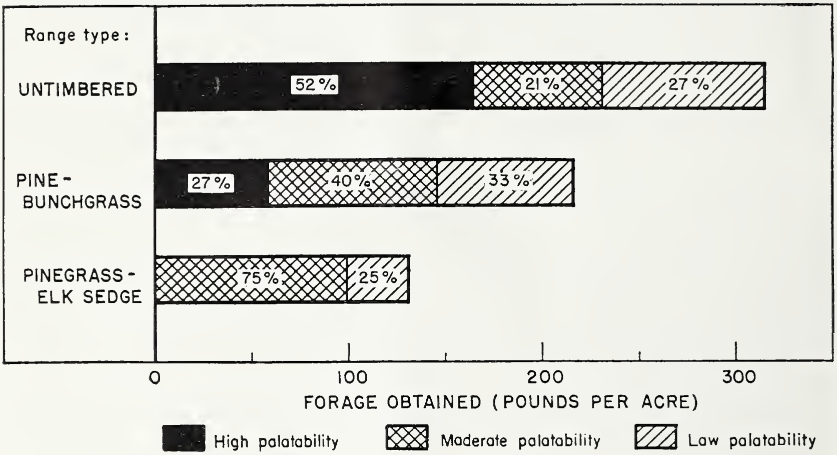

FIGURE 8.—Amount of forage obtained on 3 range types from vegetation of low (less than 25 percent), moderate (25-49 percent) and high (50 percent and over) palatability to cattle.

If the better grasses on the untimbered range are grazed within safe limits, there is little danger of overutilizing the remainder of the range area. Moreover, if the condition of the untimbered grassland is improving or is satisfactory, so also is the rest of the range. Eastern Oregon stockmen can pretty well "read" the condition of summer cattle range by noting the general abundance and thriftiness of the important forage grasses on the untimbered grassland areas.

It is clear that if the number of cattle grazed is so great as to obtain considerable use of the low-value vegetation on the pinegrass-elk sedge range—the least productive type—then the good forage species on the untimbered areas, and also the elk sedge on timbered tracts, will be seriously overgrazed.

The effectiveness of measures taken to keep cattle well distributed can be determined by noting the intensity to which the better grasses are grazed on the scattered grassland types. If these are generally overgrazed in one sector and undergrazed in another, there is good evidence that the distribution of cattle is unbalanced.

Waste Areas Should Be Recognized

Some portions of eastern Oregon summer range, such as the Douglas-fir-western larch-white fir or "north slope" type (fig. 9) and the immature lodgepole pine stands are too densely timbered to be grazed readily by cattle. Here the mature trees are closely spaced and the young fir and larch that grow beneath the forest canopy so dense that cattle ordinarily avoid these areas with their rather scant supply of vegetation suitable for forage. Such areas should be recognized as waste and eliminated from consideration in calculating grazing capacity. To attempt to get even moderate use of them requires such heavy stocking of the range as a whole that the forage plants on the more productive and easily accessible tracts are severely overgrazed.

The forage in the dense timber, however, while rather poor in quality and small in quantity, is of some value and may be used in severe drought years that occasionally occur in eastern Oregon. This vegetation should be considered only as insurance against a temporary shortage—not as part of the available forage supply.

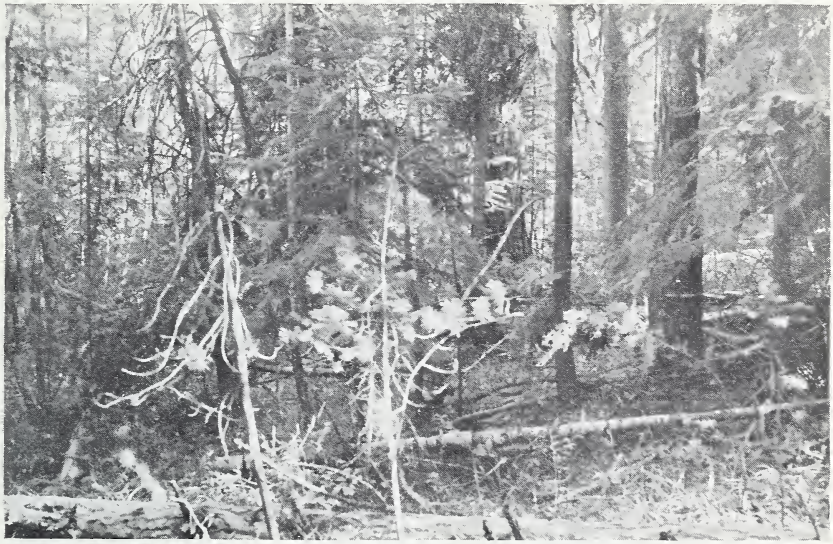

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Figure 9.—Areas of Douglas-fir-western larch-white fir timber usually found on north slopes in the mountains of eastern Oregon are largely waste as cattle range, although some plants occur that would be grazed in less dense timber stands.

HOW TO RECOGNIZE GOOD AND POOR CONDITION OF UNTIMBERED RANGE

The high grazing value of untimbered grassland in good condition, and the need for maximum forage production on summer ranges make it desirable that stockmen and range administrators recognize the condition of their ranges, especially the untimbered areas. If these are kept in good condition, the less-used timbered areas and the summer range as a whole will be productive and well-managed.

BUNCHGRASS RANGE

In Good Condition.—Bunchgrass range in good condition is primarily a grass range with few weeds and shrubs present (fig. 3). The vegetation is so dense as to give the appearance of a nearly full stand. More than 50 percent of the ground is covered by vegetation, which stabilizes the soil and maintains its fertility.

Bluebunch wheatgrass is the most plentiful and prominent grass, and being highly palatable, it furnishes much forage. Idaho fescue, another large, valuable bunchgrass, is also abundant and conspicuous. Prairie junegrass, while less abundant, is present in sufficient quantity to add desirable variety to the forage.

Sandberg bluegrass is present but not important on bunchgrass ranges in good condition. It grows as an understory to the larger, more valuable grasses, but does not make up a conspicuous part of the vegetation.

In Poor Condition.—Bunchgrass range in poor condition produces far less forage. Much less herbage is available, and only a small proportion of the soil is covered by vegetation. Bluebunch wheatgrass, Idaho fescue, and prairie junegrass are usually greatly reduced in quantity and vigor, and sometimes totally killed out. Sandberg bluegrass almost invariably is the chief grass.

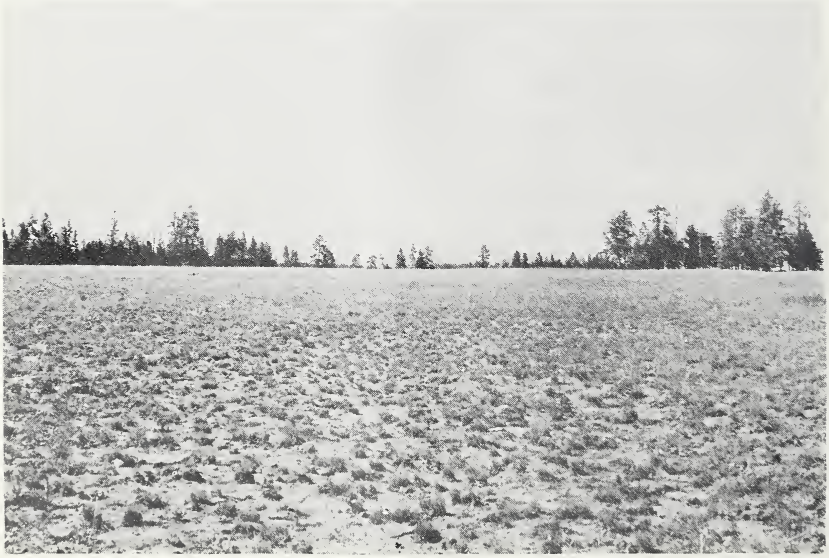

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FIGURE 10.—Untimbered bunchgrass range in poor condition. Much of the plant cover, most of the valuable range grasses, and a large amount of fertile topsoil have been lost. Low-value Sandberg bluegrass, standing on pedestals 2 to 3 inches high as the result of accelerated erosion, ordinarily is the chief grass.

This plant, which has a very shallow root system, usually grows on soil pedestals 2 to 3 inches high, indicating that the topsoil has been rapidly eroded as a result of the elimination of the taller, deeper rooted bunchgrasses (fig. 10). Weeds, such as western yarrow, tarweed, Wyeth eriogonum, low gumweed, and rush pussytoes—all very poor cattle forage—are common.

Changes in Condition.—Ranges improve or decline in accordance with the management of grazing on them. Good range management aims to maintain the productivity of ranges in good or excellent condition and to improve deteriorated ranges.

Improvement of bunchgrass ranges from poor condition is indicated by the establishment and vigorous growth of young plants of the more valuable grasses—bluebunch wheatgrass, Idaho fescue, and prairie junegrass. These should be spreading over bare spaces and the less valuable Sandberg bluegrass and weeds should be losing vigor or decreasing in density. Litter should be accumulating on the ground.

On a bunchgrass range which is declining from good condition the valuable grasses lack vigor, and portions of bunches are dying. Seed production of worth-while grasses is apt to be low, and few if any seedlings can be found. Sandberg bluegrass and low-value weeds may be vigorous and increasing in abundance and density by enlargement of old plants and establishment of seedlings. There is usually little or no litter between the plant clumps.

DRY-MEADOW RANGE

In Good Condition.—Dry meadows in good condition are heavy producers of cattle forage (fig. 11). More than half, and fre-

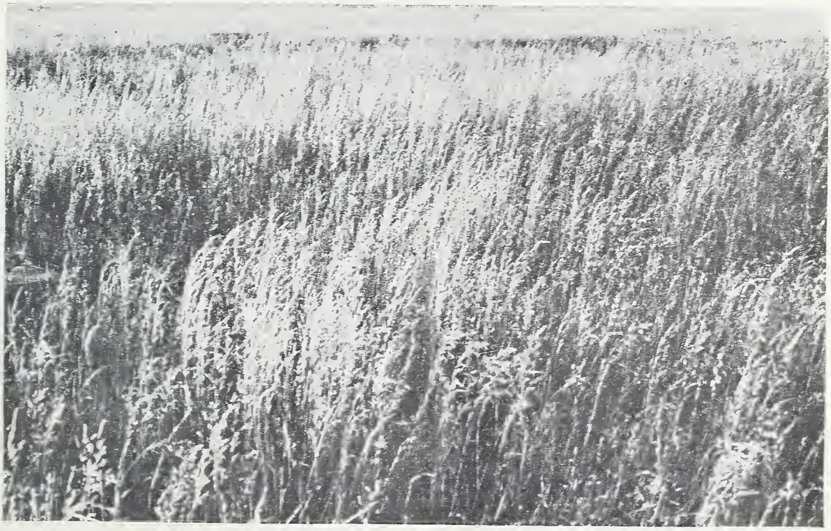
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FIGURE 11.—Dry meadows in good condition produce abundant cattle forage that ordinarily consists chiefly of thin bentgrass, a species that forms a dense sod which effectively controls soil erosion.

quently as much as 80 percent of the ground is covered with vegetation, and the stand gives the appearance of an almost solid cover. Palatable, sod-forming grasses, such as thin bentgrass, red fescue, and Kentucky bluegrass, are dense and comprise most of the vegetation.

In Poor Condition.—Dry meadows in poor condition support a much thinner stand of vegetation than meadows in good condition, and most of the herbage is produced by inferior forage species. Scabs, with scant vegetation and rocky surface soils—a result of abnormal erosion of the more valuable and fertile finer soil particles—are numerous. The chief grasses are Sandberg and Oregon bluegrass, one-spike and California danthonia, and annual hairgrass. All but the last are perennial bunchgrasses usually found on distinct soil pedestals, indicating a loss of soil. The almost worthless hairgrass—ordinarily one of the most conspicuous plants on dry meadows in poor condition— is a light, feathery annual that does not account for much weight or density in the plant cover. Rushes and weeds such as low gumweed, pussy clover, Oregon checkermallow, tarweeds, and rush pussytoes are also common on deteriorated dry meadows.

Changes in Condition.—On dry meadows that have formerly deteriorated but are improving, the valuable sod-forming grasses —thin bentgrass, red fescue, and Kentucky bluegrass—are vigorous and clumps are enlarging. Seedlings of these desirable species can be found on the scabs under the protection of rocks or plant debris. The soil is becoming more mellow with an accumulation of plant litter and increase of organic matter.

Deterioration of dry meadows from good condition is indicated by the low vigor and poor seed production of the valuable grasses. The sod of these species is breaking up, and dead portions indicate that the stand is thinning. Inferior bunchgrasses, Sandberg and Oregon bluegrass, and annual hairgrass and low-value weeds may be vigorous and increasing in density and number.

SUMMARY

Summer cattle ranges provide an important part of the yearlong maintenance of cattle in eastern Oregon. Since they are inadequate to maintain all of the cattle that can be provided for on other seasonal ranges and harvested feeds during the rest of the year, it is essential that they be used as efficiently as possible.

Most mountain summer ranges support trees varying from scattered stands to dense forests. Values other than for range such as timber, watershed, and recreation must be considered in their management. The untimbered ranges—bunchgrass and dry meadows—although limited in area are most sought after for grazing and in many places have deteriorated because of past misuse. The other summer-range types—pine-bunchgrass and pinegrass-elk sedge—have not been so heavily grazed.

The untimbered types are essentially grasslands. Seventy-two percent of the forage produced on these types within the Starkey Experimental Range, where this study was conducted, came from grasses. Five grasses, bluebunch wheatgrass, prairie junegrass, Idaho fescue, red fescue, and thin bentgrass, provided the bulk of the forage. These grasses are productive, palatable, and nutritious throughout the grazing season.

Pine-bunchgrass ranges support many of the forage plants found on the untimbered grasslands and in addition a number of shade-loving species. Only 58 percent of the forage was provided by grasses and grasslike plants, of which elk sedge, Idaho fescue, prairie junegrass, and bluebunch wheatgrass were most valuable. One-third of the forage was provided by weeds, principally hawkweeds. Shrubs are more plentiful than on untimbered ranges but provide less than one-tenth of the forage.

In the pinegrass-elk sedge type, grasses and grasslike plants made up 73 percent of the forage. Pinegrass and elk sedge are the principal species. Weeds, especially hawkweeds and heartleaf arnica, add variety.

Cattle graze the untimbered grasslands steadily throughout the summer grazing season. Timbered ranges are grazed most heavily during the first half of the season. Of the total use made of the timbered types, four-fifths is completed by August 20—before the forage declines in palatability and nutritive value. After that time cattle grazing is concentrated largely on the untimbered openings.

Because of the productiveness and value of untimbered grasslands, management of eastern Oregon summer ranges should be based largely on them. It is important that they be maintained in a good productive condition, or if they have deteriorated, that they be managed so as to restore their condition.

Bunchgrass range in good condition is primarily a grass range and the vegetation covers 50 per cent or more of the soil and provides adequate protection against erosion. Bunchgrass range that has deteriorated to poor condition has a less dense plant cover that contains less of the valuable grasses, and Sandberg bluegrass is conspicuous. Accelerated erosion is commonly indicated by pedestaling of bunchgrasses. Improvement is shown by a vigorous growth of seedlings and young plants of the more valuable grasses and the accumulation of litter on the ground. On bunchgrass ranges declining from good condition the valuable grasses are losing vigor and Sandberg bluegrass or low-value weeds may be vigorous and increasing in abundance.

Dry-meadow ranges in good condition are heavy producers of forage and present almost a solid plant cover with little bare soil visible. Dry meadows in poor condition support a much thinner stand of vegetation, chiefly inferior species. Much bare soil is present and erosion has resulted in pedestaling of plants and exposure of rock. When dry meadows are deteriorating from good condition the valuable sod-forming grasses are low in vigor and the sod is breaking up. Inferior bunchgrasses may be vigorous and increasing in density. On dry-meadow ranges that are improving seedlings of valuable grasses are becoming established and tufts are spreading and making vigorous growth.

COMMON AND BOTANICAL NAMES OF SPECIES MENTIONED

GRASSES

Bentgrass, thin ("leafy redtop")	*Agrostis diegoensis*
Bluegrass, Kentucky	*Poa pratensis*
Bluegrass, Oregon	*P. vaseyochloa*
Bluegrass, Sandberg	*P. secunda (including P. canbyi)*
Bluegrass, Wheeler	*P. nervosa*
Brome, cheatgrass ("cheatgrass," "downy brome," "downy chess")	*Bromus tectorum*
Brome, mountain	*B. carinatus (syns. B. marginatus, B. polyanthus)*
Brome, soft	*B. mollis*
Danthonia, California	*Danthonia californica*
Danthonia, one-spike ("one-spike oatgrass")	*D. unispicata*
Fescue, Idaho	*Festuca idahoensis*
Fescue, red	*F. rubra*
Fescue, western	*F. occidentalis*
Hairgrass, annual	*Deschampsia danthonioides*
Hairgrass, slender	*D. elongata*
Hairgrass, tufted	*D. caespitosa*
Junegrass, prairie	*Koeleria cristata*
Pinegrass	*Calamagrostis rubescens*
Trisetum, tall	*Trisetum canescens*
Wheatgrass, bluebunch	*Agropyron spicatum*

GRASSLIKE PLANTS

Rushes	*Juncus* spp. (principally *J. confusus* and *J. dudleyi*)
Sedge, elk	*Carex geyeri*

WEEDS

Arnica, heartleaf	*Arnica cordifolia*
Arnica, "sororia"	*A. sororia*
Aster, western	*Aster occidentalis*
Checkermallow, Oregon	*Sidalcea oregana*
Clover, pussy	*Trifolium plumosum*
Eriogonum, Wyeth	*Eriogonum heracleoides*
Frasera, showy	*Frasera speciosa*
Gumweed, low	*Grindelia nana*
Hawkweeds	*Hieracum* spp. (principally *H. albiflorum, H. chapacanum,* and *H. scouleri*)
Iris, Rocky Mountain	*Iris missouriensis*
Lupines	*Lupinus* spp. (principally *L. caudatus, L. leucophyllus,* and *L. sulphureus*)
Pearleverlasting, common	*Anaphalis margaritacea*
Penstemon, yellow	*Penstemon confertus*
Pussytoes, rush	*Antennaria luzuloides*
Sieversia, prairiesmoke	*Sieversia ciliata (= Geum ciliatum)*
Stonecrop, Douglas	*Sedum douglasi*
Strawberries	*Fragaria* spp.
Tarweeds	*Madia* spp.
Willowweed, autumn	*Epilobium paniculatum*
Wyethia, mules-ears	*Wyethia amplexicaulis*
Yarrow, western	*Achillea lanulosa*

SHRUBS

Bitterbrush, antelope	*Purshia tridentata*
Manzanita, pinemat	*Arctostaphylos nevadensis*
Rose, peafruit ("bluster rose")	*Rosa pisocarpa*
Sagebrushes	*Artemisia* spp.
Snowberry, common	*Symphoricarpos albus*
Spirea, shinyleaf ("birchleaf s.")	*Spiraea lucida*

TREES

Douglas-fir	*Pseudotsuga taxifolia*
Fir, grand	*Abies grandis*
Larch, western	*Larix occidentalis*
Pine, lodgepole	*Pinus contorta latifolia*
Pine, ponderosa	*P. ponderosa*

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